

CLAIMS

What is claimed is:

- 5 1. An on-chip inductor comprises:

dielectric layer; and

10 conductive winding on the dielectric layer, wherein the
conductive winding has a substantially square geometry,
wherein corners of the conductive winding are geometrically
shaped to reduce impedance of the on-chip inductor at an
operating frequency.

- 15 2. The on-chip inductor of claim 1, wherein the geometric
shaping of the corners further comprises:

an interior angle per corner of approximately ninety
degrees; and

20 an exterior angle per corner of approximately one hundred
thirty-five degrees.

- 25 3. The on-chip inductor of claim 1, wherein the geometric
shaping of the corners further comprises:

an interior angle per corner of approximately one hundred
thirty-five degrees; and

30 an exterior angle per corner of approximately one hundred
thirty-five degrees.

20250303 03:42:00

4. The on-chip inductor of claim 1, wherein the conductive winding further comprises:

a spiral configuration, wherein the corners of the spiral configuration are geometrically shaped to reduce impedance of the on-chip inductor at the operating frequency.

5. The on-chip inductor of claim 1, wherein the conductive winding further comprises:

a first winding on a first layer;

a second winding on a second layer; and

at least one bridge connecting the first winding to the second winding.

6. The on-chip inductor of claim 1, wherein the geometric shaping of the corners further comprises:

angled exterior corners, wherein at least one angle per exterior corner reduces current turbulence in the corner at the operating frequency.

7. The on-chip inductor of claim 6, wherein the geometric shaping of the corners further comprises:

angled interior corners, wherein at least one angle per interior corner further reduces current turbulence in the corner at the operating frequency.

8. An on-chip transformer comprises:

primary conductive winding that has a substantially square geometry, wherein corners of the primary conductive winding are geometrically shaped to reduce impedance of the primary conductive winding at an operating frequency; and

secondary conductive winding that has a substantially square geometry, wherein corners of the secondary conductive winding are geometrically shaped to reduce impedance of the secondary conductive winding at an operating frequency, wherein the secondary conductive winding is magnetically coupled to the primary conductive winding.

9. The on-chip transformer of claim 8, wherein the geometric shaping of the corners further comprises:

an interior angle per corner of approximately ninety degrees; and

an exterior angle per corner of approximately one hundred thirty-five degrees.

10. The on-chip transformer of claim 8, wherein the geometric shaping of the corners further comprises:

an interior angle per corner of approximately one hundred thirty-five degrees; and

an exterior angle per corner of approximately one hundred thirty-five degrees.

11. The on-chip transformer of claim 8 further comprises:

dielectric layer;

5

the primary conductive winding on the dielectric layer,
wherein the primary conductive winding includes a spiral
configuration, wherein the corners of the spiral
configuration are geometrically shaped to reduce impedance
10 of the primary conductive winding at the operating
frequency; and

the secondary conductive winding on the dielectric layer,
wherein the secondary conductive winding includes a
15 secondary spiral configuration interwoven with the spiral
configuration of the primary conductive winding, wherein
the corners of the secondary spiral configuration are
geometrically shaped to reduce impedance of the secondary
conductive winding at the operating frequency.

20

12. The on-chip transformer of claim 8 further comprises:

first dielectric layer;

25

the primary conductive winding on the first dielectric
layer, wherein the primary conductive winding includes a
spiral configuration, wherein the corners of the spiral
configuration are geometrically shaped to reduce impedance
of the primary conductive winding at the operating

30

frequency;

2025-03-14 00:00

second dielectric layer juxtaposed to the primary
conductive winding; and

the secondary conductive winding on the secondary
5 dielectric layer, wherein the secondary conductive winding
includes the spiral configuration, wherein the corners of
the spiral configuration are geometrically shaped to reduce
impedance of the secondary conductive winding at the
operating frequency.

10 13. The on-chip transformer of claim 8, wherein each of
the primary and secondary conductive windings further
comprises:

15 a first winding on a first layer;

a second winding on a second layer; and

at least one bridge connecting the first winding to the
20 second winding.

14. The on-chip transformer of claim 8, wherein the
geometric shaping of the corners further comprises:

25 angled exterior corners, wherein at least one angle per
exterior corner reduces current turbulence in the corner at
the operating frequency.

15. The on-chip transformer of claim 14, wherein the
30 geometric shaping of the corners further comprises:

20240803 09:44:00

angled interior corners, wherein at least one angle per interior corner further reduces current turbulence in the corner at the operating frequency.

2021-03-04 10:07:41

16. A method for manufacturing an on-chip inductor comprises:

creating a dielectric layer; and

5

creating a conductive winding on the dielectric layer, wherein the conductive winding has a substantially square geometry, wherein corners of the conductive winding are geometrically shaped to reduce impedance of the on-chip inductor at an operating frequency.

10

17. The method of claim 16, wherein the creating of the conductive winding further comprises:

15

creating the geometric shaping of the corners to include an interior angle per corner of approximately ninety degrees, and an exterior angle per corner of approximately one hundred thirty-five degrees.

20

18. The method of claim 16, wherein the creating of the conductive winding further comprises:

creating the geometric shaping of the corners to include an interior angle per corner of approximately one hundred thirty-five degrees, and an exterior angle per corner of approximately one hundred thirty-five degrees.

25

19. The method of claim 16 further comprises:

30

creating the conductive winding to have a spiral configuration, wherein the corners of the spiral

202503142001

configuration are geometrically shaped to reduce impedance of the on-chip inductor at the operating frequency.

20. The method of claim 16, wherein the creating of the
5 conductive winding further comprises:

creating a first winding on a first layer;

creating a second winding on a second layer; and

10 connecting the first winding to the second winding with at least one bridge.

21. The method of claim 16, wherein the creating of the
15 conductive winding further comprises:

creating the geometric shaping of the corners to include angled exterior corners, wherein at least one angle per exterior corner reduces current turbulence in the corner at
20 the operating frequency.

22. The on-chip inductor of claim 21, wherein the creating of the conductive winding further comprises:

25 creating the geometric shaping of the corners to include angled interior corners, wherein at least one angle per interior corner further reduces current turbulence in the corner at the operating frequency.

20250720 08:44:00

23. A method of manufacturing an on-chip transformer comprises:

creating primary conductive winding that has a

5 substantially square geometry, wherein corners of the primary conductive winding are geometrically shaped to reduce impedance of the primary conductive winding at an operating frequency; and

10 creating secondary conductive winding that has a substantially square geometry, wherein corners of the secondary conductive winding are geometrically shaped to reduce impedance of the secondary conductive winding at an operating frequency, wherein the secondary conductive
15 winding is magnetically coupled to the primary conductive winding.

24. The method of claim 23, wherein the creating of the primary and secondary conductive windings further

20 comprises:

creating the geometric shaping of the corners to include an interior angle per corner of approximately ninety degrees, and an exterior angle per corner of approximately one
25 hundred thirty-five degrees.

25. The method of claim 23, wherein the creating of the primary and secondary conductive windings further comprises:

30

creating the geometric shaping of the corners to include an interior angle per corner of approximately one hundred

2025 RELEASE UNDER E.O. 14176

thirty-five degrees, and an exterior angle per corner of approximately one hundred thirty-five degrees.

26. The method of claim 23 further comprises:

5

creating dielectric layer;

10

creating the primary conductive winding on the dielectric layer, wherein the primary conductive winding includes a spiral configuration, wherein the corners of the spiral configuration are geometrically shaped to reduce impedance of the primary conductive winding at the operating frequency; and

15

creating the secondary conductive winding on the dielectric layer, wherein the secondary conductive winding includes a secondary spiral configuration interwoven with the spiral configuration of the primary conductive winding, wherein the corners of the secondary spiral configuration are geometrically shaped to reduce impedance of the secondary conductive winding at the operating frequency.

20

27. The method of claim 23 further comprises:

25

creating a first dielectric layer;

30

creating the primary conductive winding on the first dielectric layer, wherein the primary conductive winding includes a spiral configuration, wherein the corners of the spiral configuration are geometrically shaped to reduce impedance of the primary conductive winding at the operating frequency;

creating a second dielectric layer juxtaposed to the primary conductive winding; and

- 5 creating the secondary conductive winding on the secondary dielectric layer, wherein the secondary conductive winding includes the spiral configuration, wherein the corners of the spiral configuration are geometrically shaped to reduce impedance of the secondary conductive winding at the
10 operating frequency.

28. The method of claim 23, wherein creating each of the primary and secondary conductive windings further comprises:

- 15 creating a first winding on a first layer;

creating a second winding on a second layer; and

- 20 connecting the first winding to the second winding with at least one bridge.

29. The method of claim 23, wherein the creating of the primary and secondary conductive windings further

- 25 comprises:

creating the geometric shaping of the corners to include angled exterior corners, wherein at least one angle per exterior corner reduces current turbulence in the corner at
30 the operating frequency.

30. The method of claim 29, wherein the creating of the primary and secondary conductive windings further comprises:

- 5 creating the geometric shaping of the corners to include angled interior corners, wherein at least one angle per interior corner further reduces current turbulence in the corner at the operating frequency.